Description

A SKIN RESURFACING DEVICE

Technical Field

[1] The present invention relates to a skin resurfacing device. More particularly, this invention relates to a skin resurfacing device that peels the outermost layers of skin to provide a refreshed skin surface.

Background Art

[2] Dermabrasion is the process of removing skin blemishes or imperfections. By removing the outermost layer of skin, pigment lesions, skin discoloration, aging spots, lines, and other skin blemishes or imperfections can be treated and often repaired.

[3] One technique in dermabrasion is to abrade the skin surface using compressed air, and a powdered, abrasive substance, typically microcrystals of quartz, metal, or aluminum oxide, then removing the abrasive substance and loosened skin tissue using a vacuum. The vacuum, through a treatment tool, collects skin debris after the crystals abrade the epidermis.

[4] Another technique in dermabrasion is permanently attaching an abrasive material to the treatment tip, instead of a powdered substance. Often the permanently attached abrasive materials are diamonds, aluminum oxide, silicon carbide, silicon oxide, or metal nitrade. (U.S.Patent Nos. 6,241,739 and 6,500,183). A disadvantage of this technique is when skin debris is held and remains between abrasive particles, it is very difficult to remove the debris completely. Remaining debris may cause serious medical problems such as bacteria infection. Remaining debris also degrade abrasion performance. Disadvantages of the prior art include the need for these techniques to be typically administered in medical facilities and requiring commercial means for sterilization and cleaning of the abrasive tip. Thus, these techniques of dermabrasion are often very expensive.

Disclosure

[5] The present invention contrives to solve thedisadvantage of the prior art.

[6] An objective of the invention is to provide a skin resurfacing device designed for both domestic and professional use that is inexpensive and simple to use. Another objective of the invention is to provide a disposable and replaceable skin resurfacing device so there is either no need or minimum need to sanitize or clean the abrasive tip that contacts and peels the skin. Yet another objective of the invention is to provide a double filtering system that is visible to the user to insure proper functioning of the

skin resurfacing device.

[7] To achieve the above objectives, a device for skin resurfacing comprises a skin treater, and a vacuum source connected to the skin treater. The skin treater comprises a hollow tube having a first end, a second end, an abrasive tip detachably fixed on the first end, a first filter that is provided inside the tube between the first end and the second end where the vacuum source is connected to the second end. The hollow tube of the skin treater has a transparent portion so that the filter is visible outside. The abrasive tip has abrasive particles. In another embodiment of the skin treater, the parts are not detachable, but the entire skin treater is disposable.

[8] The abrasive particles of the abrasive tip consist of aluminum oxide crystals, silicon carbide crystals, or silicon oxide crystals having a predetermined range of size from about sixty (60)mmto about one hundred fifty (150)mm. The abrasive tip is made by pressure molding and heat treating the abrasive particles. The abrasive tip has a flat annular portion that contacts the skin of a user, and wherein a suction hole is provided in the annular portion through which air is sucked. The abrasive tip is coated with liquid ceramic material that is colored with different colors according to the different size of abrasive crystals. In another embodiment of the abrasive tip, the abrasive tip has a roller that protrudes from the flat annular portion so the roller contacts and rolls on the skin of the user.

[9] The skin resurfacing device has a skin sensor that measures the oiliness of the skin of a user. The intensity of the vacuum provided by the vacuum source isautomatically controlled according to the measured oiliness by the skin sensor or manually controlled by the user. The skin resurfacing device has a timer that controls the operation time of the device.

[10] There is also a second filter between the skin treater and the vacuum source that includes a container that with an open end, a lid that plugs the open end, an inlet pipe passing through the lid, an outlet pipe passing through the lid, and a filter element that is fixed to the outlet pipe. The container is detachable from the lid.

[11] The advantages of the present invention are: (1) a skin resurfacing device of the present invention is suitable for mass production at low cost; (2) a skin resurfacing device that is inexpensive in relation to other skin resurfacing devices; (3) the skin resurfacing device that is made for both personal and professional use; (4) the skin resurfacing device that has a double filtering system filters the skin debris with greater efficiency; (5) a skin treater of the skin resurfacing device that has detachable parts for ease of disposal, replacement, and cleanliness; and (6) a skin treater that provides a re-

placeable and disposable abrasive tip.

[12] Although the present invention is briefly summarized, the fuller understanding of the invention can be obtained by the following drawings, detailed description and appended claims.

Description Of Drawings

[13] These and other features, aspects and advantages of the present invention will become better understood with reference to the accompanying drawings, wherein:

[14] FIG. 1 is a perspective view of a skin resurfacing device according to the present invention;

[15] FIG. 2 is an elevation view of a skin treater;

[16] FIG. 3 is a cross-sectional view taken along the line 3-3 of FIG. 2;

[17] FIG. 4 is a rear view of the skin resurfacing device;

[18] FIG. 5 is a cross-sectional view of a second filter;

[19] FIG. 6 is a block diagram of the skin resurfacing process;

[20] FIG. 7 is a cross-sectional view of another embodiment of a skin treater and abrasive tip; and

[21] FIG. 8 is a cross-sectional view of the an abrasive tip with a roller.

[22] FIG. 9 is a sectional view of an abrasive tip assembly according to another embodiment of the present invention.

Best Mode

[23] FIG. 1 shows a skin resurfacing device **10** which has a housing **12**, a skin sensor **22**, and a skin treater **34**. The housing **12** comprises an ON/OFF switch **14**, a skin sensor starting button **16** to measure the level of skin oiliness, a skin peeling start button **18** to begin the skin peeling process, and a pressure controller button **20** for controlling the intensity of the peeling pressure and vacuum pressure. The skin sensor **22** is connected to the housing **12** by an electrical wire **24**. Skin sensor electrodes **26** that measure the oiliness of the skin are provided on the skin sensor **22** on the opposite end of the electrical wire **24**. The skin sensor **22** can be placed in the skin sensor slot **28** when the skin sensor **22** is not in use. The skin resurfacing device **10** adjusts the pressure applied in the peeling process based on the oiliness of skin measured by the skin sensor **22**. The intensity of the peeling pressure and vacuum pressure is also controllable with the pressure controller button **20** and the amount of intensity is indicated by the pressure indicator **30**. The LED timer **32** times each individual skin resurfacing session. When the device **10** is turned on, the timer is reset for a time that is usually from 15 to 20 minutes.

[24] A skin treater **34** has a hollow tube **35** having a first end **38**, a second end **42**, an abrasive tip **36** detachably fixed on the first end **38**, and a first filter **64** provided between the first end **38** and the second end **42**. The skin treater **34** is connected to a vacuum source inside the housing **12** by a tubular hose **44** at the second end **42**. The strength of vacuum is displayed by the LED pressure indicator **30**. The user can manually adjust the vacuum strength that has been automatically set by the device **10**. The contact strength of the skin treater **34** on the skin of the user follows the vacuum strength. When the vacuum is strong, the abrasive tip **36** adhere to the skin more tight. After the timer is off, the device continues to suck air for about 10 seconds so that debris within the skin treater **34** is removed.

[25] FIG. 2 is a front elevation view of the skin treater **34**. The hollow tube **35** includes an abrasive tip **36**, a first tube **39**, a transparent portion **40**, and a second tube **43**. The first filter **34** is located inside the transparent portion **40**. The abrasive tip **36**, first tube **39**, transparent portion **40**, first filter **64**, and second tube **43** are all detachable for ease of cleaning and replacement. The transparent portion **40** of the skin treater **34** allows the first filter **40** to be visible to the user. Thus, the user is able to see and confirm that the skin resurfacing device **10** is functioning properly. The transparent portion **40** that allows visibility of the first filter **40** also serves to inform the user when the skin treater **34** and all the comprising parts need replacement, either individually or as a whole.

[26] As shown in FIG. 3 the abrasive tip **36** has a flat annular portion **60** that contacts the skin of the user. The abrasive tip **36** also has a suction hole **62** in the annular portion **60** where air is suctioned in causing skin particles peeled by the abrasive tip **36** to be suctioned in as well. Once the abrasive tip **36**, which is made of aluminum oxide or silica oxide crystals between the predetermined range of sixty (60)mmto about one hundred fifty (150)mm, peels the outer layer of the skin, it is suctioned through the suction hole **62** as the skin treater **34** is moved along the skin in a direction consistent with the muscles of the skin. The variance in range of the crystals on the abrasive tip producesdifferent levels of abrasion, with the larger particles peeling skin more rapidly. The abrasive tips are color-coordinated according to the predetermined range and are easily detachable and replaceable. The abrasive tip is made by pressure molding a mixture of aluminum oxide powder, silicon oxide (SiO_2) and Fe_2O_3, etc. and heat treating the molded mixture at about 2000 degree Celsius to solidify the mixture. The solidified mixture has a little porosity. However, it is desirable to remove any porosity in order not to degrade suction performance of the skin treater. Liquid ceramic material is coated on the surface of the abrasive tip to seal pores. The liquid

ceramic material is colored with a different color for a different size of abrasive crystals. Thus the color of the coating indicates abrasive particle size. Skin resurfacing operation is enhanced by choosing different abrasive size for different skin conditions.

[27] Sanitary concerns, such as skin debris lodged in and between the crystals are reduced or eliminated because the abrasive tip **36** is very easily changed. Particles and skin debris picked up by the vacuum through the suction hole **62** pass along the first tube **39** to the transparent portion 40 that contains the first filter **64**. The first filter **40** filters the debris so mostly air is passed to the second tube **43**.

[28] FIG. 4 shows the back of the housing **12** where the electrical wire **24** and the tubular hose **44** are connected. A rear recess **66** is provided in the back of the housing **12** to hold the second filter **46**. The second filter **46** is provided between the skin treater **34** and the vacuum source.

[29] FIG. 5 shows the second filter **46** comprising a lid **48** that is fixed to the housing **12**. The lid **48** contains two openings, a first opening **50** and a second opening **52**. An inlet hose **72** runs through the first opening **50**. An outlet tube **54** from the vacuum source runs through the second opening **52**. The outlet tube **54** contains a filter element **56** that acts as a second line of filtering after the first filter **64**. A container **58** with an open end **59** is provided. The open end **59** is plugged by the lid **48**. The container **58** is detachably attached to the lid **48** and encloses the inlet hose **72** and the outlet tube **54**. Any remaining debris and mostly air pass from the second tube **43** are routed into the first opening **50** of the lid **48** through the inlet tube **72** and then falls to the bottom of the container **58** due to gravity. The vacuum source provides a vacuuming effect that collects skin debris by suctioning skin peeled by the abrasive tip **36**. The vacuum source **68** also increases the closeness of contact between the abrasive tip **36** and the user's skin due to the flow of air through the skin treater **34**. The outlet pipe **54** powered by the vacuum source picks up the smaller debris. Any debris that is picked up by the outlet pipe **54** is filtered by the filter element **56** so only air flows past the filter element **56**.

[30] FIG. 6 shows a block diagram of the skin resurfacing process. To operate the skin resurfacing device **10**, the ON/OFF switch **14** activates the power supply **70**. The skin sensor **22**, with skin sensor electrodes **26** at the end, measures the oiliness of the user's skin. The controller **74** adjusts vacuum pressure of the skin peeling process. The pressure is automatically set at a constant level by the controller based on the measurement of oiliness displayed on the pressure indicator **20**. The user is also able to adjust the pressure with the pressure controller button **20** according to the desired

pressure at either constant or variable levels. The skin treated **34** is connected to the vacuum source **68** that is also adjusted by the controller **74**. The skin treater **34** is disposable.

[31] FIG. 7 shows a skin treater **34** having an abrasive tip**60**having a different shapesuch that one end of the abrasive tip may be inserted into one end a hollow tube **64** .Preferably thehollow tube**64**is made of transparent material and a filter **65** is placed within the transparent hollow tube so that the filter **65** is visible from outside.

[32] FIG. 8 shows an abrasive tip that is similar to the abrasive tip**60**but further includes a roller **76** that protrudes from the flat annular portion so that the roller **76** contacts and rolls on the skin of a user. The roller **76** is rotationally attached to the wall of the abrasive tip**60**with a rotation axis **78**. The roller **76** has a role of pressing the portion of the skin that is resurfaced by the skin resurfacing device **10**.

[33] FIG. 9 is a sectional view of an abrasive tip assembly **80** according to another embodiment of the present invention. As shown in FIG. 9, an abrasive member **82** is mounted into a generally cylindrical housing **81**. The housing is made of non-abrasive material such as plastic and metal. On the outer surface of the housing, a step portion is formed so that the housing **81** is mounted onto one end of the hollow tube **86** of the skin treater. The abrasive member **82** has a first flat surface which contacts with skin and a protruded second surface which sits on the closed end of the housing **81**. A plurality of suction holes **83** and a center hole are formed in the closed end of the housing. A mounting rod **84** is extended from the second surface of the abrasive member **82**, and it is inserted into the center hole of the housing. By an annular pin **85** fit into a groove (not shown) formed on the mounting rod, the abrasive member **82** is placed in a position within the housing. When vacuum is created within the hollow tube, air is sucked in through the annular gap between the abrasive member and the housing and through the suction holes **83**. After use, the entire assembly of the abrasive tip may be replaced for sanitary purpose.

[34] While the invention has been shown and described with reference to different embodiments thereof, it will be appreciated by those skilled in the art that variations in form, detail, compositions and operation may be made without departing from the spirit and scope of the invention as defined by the accompanying claims.

Industrial Applicability

[35] The skin resurfacing device according to the present invention has a compact and simple structure. As such the present invention may provide skin resurfacing device at a relatively low price. Further, the abrasive tip according to the present invention can

be fabricated at a low cost, so that the abrasive tip may be replaced after each treatment. Thus the present invention may prevent skin infection caused during skin peeling treatment while maintaining the skin peeling performance of conventional diamond tip skin treater.